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### Performance of Broiler Starters Fed Diets Containing Arbocel® Fine

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#### Abstract

Arbocel® fine is an insoluble fibre concentrate used outside Nigeria as fibre source in poultry diets. It is high in fibre content and unlike traditional fibre sources, it is free from contaminants and do not consume space in feed formulations. The effect of Arbocel® fine in broiler production in the tropical country of Nigeria was determined. Arbocel® fine was added to formulated broiler starter diets at 0.0, 0.6 and 0.8% and fed to 144 day old Marshal Broiler chicks. The chicks were divided into 3 treatment groups of forty eight birds each and assigned to the three treatment diets in a Complete Randomized Design (CRD) experiment replicated 4 times. The diets were fed to the broilers during 0 – 28 days of age. Results indicated that body weight gain and feed conversion ratio at 28 of age were comparable ( $P>0.05$ ) among the three diet groups. Feed intake was numerically higher ( $P>0.05$ ) in birds fed diets containing Arbocel® fine. There was significant ( $P<0.05$ ) increase in the cost of feed consumed and feed cost/kg body weight gain. Mortality was significantly ( $P<0.05$ ) reduced in the Arbocel® based diet groups. The use of 0.6 and 0.8% Arbocel® fine in broiler diets increased the cost/kg body weight gain.

**Keywords:** Arbocel® fine, insoluble fibre, concentrate, broiler

#### Introduction

In Nigeria, different fibre sources are used in poultry feed formulations, which deliver significant amount of soluble fibre which show negative effects on feed utilization in broiler chickens, often contaminated with mycotoxins and consume a lot of space in formulation (Pietsch, 2012). Arbocel® fine is an insoluble fibre concentrate with a minimum crude fibre content of 65%, maximum granule size of 8mm and maximum bulk density of 12% (Pietsch, 2012). It is free of mycotoxins, do not consume space in feed formulations, do not bind nutrients, stimulate the intestinal villi, increases enzyme binding capacity (8 – 8 gH<sub>2</sub>O/g crude concentrate) (Trautwein *et al.*, 2012). Unlike traditional fibre products Arbocel, has a remarkable advantage due to its high hygienic level of production and has proved successful in poultry diets in terms of health status, litter, animal behavior as well as performance and economy (Pietsch, 2012; Farran *et al.* 2012).

This study is designed to determine the usefulness of Arbocel® fine as feed ingredients of broiler chickens, with respect to performance, litter quality and economics.

#### Materials and Methods

The research was carried out at the Teaching and Research farm of the School of Agriculture and Agricultural Technology, Federal University of Technology Owerri, Nigeria, West Africa. Arbocel® fine was made available by Dr. Manfred Pietsch of J. Rettenmaier and Söhne (JRS) from Germany and was stored in a cool and dry environment. Three experimental broiler starter diets were formulated, such that the diets contained 0, 0.6 and 0.8% Arbocel®, respectively, partially replacing wheat offal in the diets (Table 1). One hundred and forty four (144) day old mixed sex Marshal Strain broilers were used for the experiment divided into three groups of forty-eight birds each and were randomly assigned to each of the three experimental diets in a complete randomized design (CRD) replicated 4 times. The experiment lasted for 56 days.

Data on the daily feed intake and weekly weights were obtained, while weight gains and feed conversion ratio were estimated. The data generated were statistically analyzed using analysis of variance and means were separated using the R-cran programme of R Core Team (2014).

#### Results and Discussion

In the present study, weight gain and feed conversion values were not significantly ( $p>0.05$ ) improved as was indicated in trials performed in other countries (Farran, 2012). This similarity in performance tends to show that Arbocel® fine is not region specific. Arbocel improved the overall feed intake without any improvement in feed conversion ratio. Steinfeldt (2012) reported similar high feed consumption when broilers were fed different insoluble and soluble fiber sources. Improvement in feed intake are likely to occur because of improved digestibility producing faster rates of passage of digesta through the digestive tract but not due to reduced

nutrient concentration (Rogel *et al.*, 1987a,b) since the composition diets remains similar and meets the NRC requirements for broiler chickens.

Table 1: Composition of starter and finisher diets

Ingredients	0%	0.6%	0.8%
Maize	50.00	50.00	50.00
Soy bean meal	15.00	15.00	15.00
Spent grain	13.00	13.00	13.00
PKC	4.00	4.00	4.00
Arbocel	---	0.60	0.80
Wheat offal	3.00	2.40	2.20
Fish meal	8.00	8.00	8.00
Blood meal	3.00	3.00	3.00
Bone meal	2.00	2.00	2.00
Oyster shell	1.00	1.00	1.00
Lysine	0.25	0.25	0.25
Methionine	0.25	0.25	0.25
Vit. Premix*	0.25	0.25	0.25
Salt	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated Analysis			
Crude protein	23.27	23.24	23.17
Crude fibre	4.73	5.17	5.06
Crude ash	4.05	4.01	4.00
Calcium	1.44	1.44	1.44
Phosphorus	0.92	0.91	0.91
Lysine	1.10	1.10	1.10
Methionine	0.40	0.40	0.40
Energy (kcal/kg)	2867.28	2859.74	2857.23

\* To provide the following per kg of feed: vitamin A, 12,000 iu; vitamin D<sub>3</sub>, 2,500 iu; vitamin E, 8mg; vitamin K<sub>3</sub>, 2 mg; vitamin B<sub>1</sub>, 23 mg; vitamin B<sub>2</sub>, 5 mg; vitamin B<sub>6</sub>, 4 mg; vitamin B<sub>12</sub> 8 mg, Niacin, 15 mg; pantothenic acid, 6 mg; folic acid, 4 mg; Manganese, 8 mg; zinc, 0.05 mg; iron, 20 mg; copper, 3 mg; iodine, 1.2 mg; selenium, 0.16 mg; cobalt, 2 mg.

Table 2: Performance of starter broilers fed diets containing Arbocel@fine

Parameter	Dietary Inclusion Levels (%) of Arbocel @ Fine			SEM
	0.00	0.60	0.80	
Initial body weight (g)	37.615	38.99	39.65	1.31
Final body weight (g)	683.59	691.65	678.53	28.97
Body weight gain (g)	645.97	652.66	638.88	29.60
Feed intake (g)	1645.95	1654.65	1674.36	48.60
Feed conversion ratio	2.56	2.54	2.64	0.21
Cost of feed consumed (₦/kg)	150.31 <sup>b</sup>	165.53 <sup>ab</sup>	172.38 <sup>a</sup>	4.88
Cost of feed/kg body weight gain (₦)	233.95 <sup>b</sup>	254.09 <sup>ab</sup>	271.40 <sup>a</sup>	9.97
Mortality (%)	13.94	3.85	3.85	1.99

<sup>ab</sup> means within rows with different superscripts are significantly different (p < 0.05)

Mortality was very low in birds fed Arbocel® fine diets and higher in birds fed control diet. The cause of the deaths was not determined and the factors responsible for the reduction in the Arbocel® fine group are not known. Cost of feed consumed and feed cost/kg gain were significantly higher in birds fed Arbocel® fine diets than the control. The higher values obtained may be attributed to the increased feed intake of birds fed Arbocel®

fine diets and the higher costs of the Arbocel® fine feeds, since Arbocel® fine is an imported product. Contrary to this finding, Farran (2012) recorded positive effect on the cost benefit, when Arbocel® fine was included in the diets of broilers at 0.8%. This positive effect could be achieved in Nigeria if this product is produced locally or imported in large quantity.

### **Conclusion and Recommendation**

The current results on Arbocel® fine supplementation at 0.6 and 0.8% in broiler diets showed improved quality of litter, but caused an increase in feed cost/kg gain contrary to reports from trials performed in other countries. Further research is, however, recommended to ascertain the effect of different fiber sources used in poultry diets in Nigeria, on performance, litter quality and economics of production so as to determine the possibility or otherwise of adopting Arbocel as a dietary fiber source in the country.

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